

NEWS REPORT

NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL



Volume VI, Number 4

JULY-AUGUST, 1956

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Editorial Office: 2101 Constitution Ave., Washington 25, D. C.

NEWS REPORT is published bimonthly by the National Academy of Sciences-National Research Council. It is designed to report current activities of divisions, boards, committees, and other established groups within the organization, and to record news of cooperating Societies and developments in the field of international science. It is distributed without charge to organizations and individuals directly associated with the Academy-Research Council; it is available to others at the rate of \$2.00 per year.

NEWS REPORT

National Academy of Sciences National Research Council

VOLUME VI

July-August 1956

NUMBER 4

Cancer Research and The Committee on Growth 1945-1956

R. KEITH CANNAN

Chairman, Division of Medical Sciences

A SIGNIFICANT epoch in the Division of Medical Sciences ended this summer when the American Cancer Society assumed full responsibility for conducting its multi-million-dollar programs of research. Launched in 1945 under the guidance of the Committee on Growth, the research grant and fellowship program has grown from a level of about \$730,000 to more than \$3,000,000 in the present year. During this period nearly \$25,000,000 has been awarded on the Committee's recommendation for 2,741 grants-in-aid, 500 fellowships, and 47 grants for scholars.

More recently there has been a parallel growth of additional programs administered by the Society itself—large institutional grants, special studies, and programs conducted locally by regional divisions of the Society—which by 1955 consumed nearly twice the funds allocated to the Committee on Growth. Taking stock after a decade of operations, the Society, upon recommendation of an ad hoc Research Policy Survey Committee, has decided that greater coordination and flexibility can be achieved if the entire program is centrally administered by committees of its own selection.

When the Committee on Growth was established, the most urgent problem was the re-establishment of medical research upon a peacetime footing. It was necessary to get the scientists back to their laboratories and to attempt to interest them in studies related to the problem of cancer. In many cases this meant that assistance had to be given to investigators to reactivate university and hospital laboratories from which they had been absent for several years or which had been diverted to research on problems related specifically to national defense. At the same time, it became apparent that the channels for recruitment of young investigators into medical research must be reopened. The training of a whole generation of young men had been disrupted by the war. It was not merely a question of bringing the staffs of medical schools and universities back to a prewar level. If an expanding program of research on cancer were to be contemplated—and this was clearly the intent of the American Cancer Society—means must be found to increase the number of individuals with a zest for a career in research. From the time of its inception,

therefore, the Committee has recognized the problem of increasing the trained manpower available for cancer research as its most challenging task. With the experience of ten years behind it, the Committee reaffirms the belief that the recruitment of young scientists is a continuing responsibility of those who seek to promote the progress of medical research on a broad and healthy basis.

Those who are charged with the responsibility of distributing funds for the support of a particular area of research are faced with two major questions, the answers to which will determine policy. The first question is how the funds should be distributed, that is, what forms of contract should be entered into. The second question is what research should be supported.

The answer to the "how" has grown out of a long tradition. Prior to the appearance of large government and private funds, medical research found its patrons in private individuals and private foundations. Over the years, these established the device of grants-in-aid as the accepted method of support. In general, a grant was made to and administered by an institution, but it was given specifically for the support of the work of a designated individual, group, or department within that institution. The donors were primarily interested in supporting the work of men in whom they had confidence and who desired to work within broad areas of investigation which their scientific advisors had judged to be promising and worthy of encouragement. Arrangements were worked out on an informal and personal basis on terms suitable to each individual situation. There were no rigid patterns to which grants must conform. Moreover, the grantors did not seek to pass scientific judgments on detailed experimental designs or to hold their investigators to adherence to some prearranged experimental program. The donors were more interested in men and their ideas than in the protocols of their projected investigations.

With the entrance of government and public funds into the support of scientific research in a large way, the grant-in-aid principle was widely adopted. Inevitably, however, the administrative procedures of

grant-giving became hedged around with rules and regulations that restricted their flexibility. The personal and informal rapport was replaced by application forms, detailed budgets, the deliberations of remote committees, and periodic progress reports. It could scarcely be otherwise in view of the great host of applications for support that were received by the larger agencies, and in view of the strong sense of responsibility felt by the trustees of public funds, who wished to be able to document and audit the wise and proper execution of their trust.

The result has been that grants-in-aid of projects are now the established pattern. The applicant for a grant submits a categorized application containing biographical material, an estimated budget, and an outline of the "project" that he proposes to undertake. This is expected to be described in sufficient experimental detail to allow evaluation by a group of the applicant's scientific peers. These advisory groups then make their recommendations not only on the basis of the competence of the investigator and the adequacy of the facilities at his command, but also on their judgment of the soundness of the experimental program. Ostensibly, the grant that is made has the qualities of a contract to carry out a specifically designated task.

Much has been said and written in criticism of the system of project grants. Its immediate impact on scientists and on scientific institutions and its more subtle long-term effect on scholarship and on academic institutions are matters of great moment, but will not be pursued here. What may be said is that some of the criticism is more valid with respect to the principles involved than to current administrative practice. The major agencies involved in grants for medical research have administered their affairs with a degree of understanding of the welfare of science that has, in general, given to the investigator the utmost freedom in the prosecution of his studies. In form, grants have been given for the execution of designated tasks; in practice, awards have been made on the basis of the evaluation of the investigator and his ideas rather than on the plan which he has imposed upon himself.

The Committee on Growth, from its inception, has affirmed the conviction that while the research program of the American Cancer Society should be focused on the control of cancer in man, it should be built upon the broadest base of research in the physical and biological sciences.

In the field of cancer no valid distinction can be drawn between pure and applied research. The investigator in the basic sciences is constantly developing new ideas, devising new tools, and exploring new methods of approach which he refines and passes on to the clinical investigator. The latter, as constantly, is redefining problems, passing back new leads, testing out ideas at the clinical level, and thereby channeling the effort of the "random" investigator. The direct and oblique approaches are not so much competitive as complementary. The issue is not between alternative strategies. If you are faced by a stubborn enemy, a frontal assault is strengthened, not weakened, by a simultaneous and sustained attack upon his lines of communication and his source of supply. Concentration of effort is good strategy when you have taken the measure of your opponent, have counted his resources, and have found his weaknesses. However, it is poor strategy to concentrate your forces in a war of maneuver when you are still feeling out the opposition, still seeking out his main line of defense. In this situation, pressure must be maintained on all fronts. One must probe continually, anywhere and everywhere, looking for the weak spots. The war on cancer is still a war of maneuver. We are not yet in position for the grand assault. We are not yet sure what types of weapons will be most effective.

In this situation almost all major areas of medical research may be of immediate significance as contributions to the control of cancer in man. Any study is pertinent that advances our knowledge of the physiology of the cell and of the factors that control multiplication and differentiation, as is any new knowledge of the determinants of cell specificity, of response to chemicals, hormones, and viruses. In the present state of knowledge it is less a matter of scientific judgment than scientific intuition to decide whether a particular study bears immedi-

ately or remotely on the problem of cancer.

The Committee, persuaded that it is impossible to give an enlightened definition of the boundaries of cancer research, has made no attempt to delineate closely the types of studies which it is interested in encouraging. It has not said, "These are the questions to which we seek the answers." The Committee has left the investigators the freedom to frame their problems in the way they see them and to design their experiments in the way that seems best to them. The ideas behind the projects that have had the support of the Committee did not come from the Committee. Instead, they came from the investigators conducting the projects. The answer to the question "What is cancer research?" has not been so much a decision of the Committee as the integration of the judgments of all those scientists across the country who have believed that they had something that they could contribute to the problem of cancer. The grant-in-aid program has been a program of a congress of several hundred working scientists. No committee, however wise, can substitute for this consensus. No wise committee would attempt to do so.

There is a place for planned research in the field of cancer. There is a place, a more important place, for the random investigator. The role of the former is to consolidate ground already won, that of the latter is to seek out new worlds to conquer. Planned research can take a defined body of knowledge and lay out a set of experiments which will exploit this knowledge to its foreseeable limits. It can take a set of postulates and drive them home to their rational conclusions. It can do this with exhaustive thoroughness, economy, and speed. Within its limitations it is efficient, expeditious, and authoritative.

In the world of ideas, planned research is research in blinders. Organized research is inclined to follow the fashions. As Henry Allen Moe has remarked, "It is precisely when a field has become modish and accepted, when its vested interests are at their highest, that it tends to become sterile." One cannot plan new ideas because one cannot plan for the unexpected. Now, if there be one lesson which the

faithful disciple of science learns the hard way, it is that new ideas are to be sought down the road of the unexpected. An experiment that fails is the beginning of understanding. The remote controller, on the other hand, tends to be impatient of experiments that fail. They upset his well-laid plans. He is inclined to dismiss them as irrelevancies. The imaginative investigator who has actually made the unexpected observations welcomes them because he knows that Nature betrays herself in her eccentricities rather than in her adherence to conventional behavior.

The business of the administrator in research is to choose the men to do the work, to apprehend the significance of their ideas, to provide them with the tools, and to keep open the lines of communication. One cannot chart the unknown. The individual investigator must be given the freedom to seek out new knowledge in his own way. The experiments which he will conduct must be left to his own intuitive compulsions. They cannot be directed by remote control. Interests will change and emphasis will shift as new techniques and new ideas remold his thoughts. The best that the administrator can do is to be alert to the shifting climate of thought so that he may trim the sails of his effort to the best advantage.

In the decade in which the Committee on Growth has been in operation, there have been spectacular developments in technique that have stimulated new approaches to research on cancer. The wide use of isotopes as tracers, the phenomenal power and scope of chromatography as a tool for precision analysis at the micro level, and the growing dependence on complex physical instruments, such as the electron microscope, electrophoretic equipment, and analytical centrifuges, spectrophotometers, and a bewildering variety of applications of electronics to physiological measurements, have all combined to open up new fields of investigation and have made possible studies of the intimate physiology of the cell that were simply not within the scope of experimental inquiry ten or fifteen years ago.

The progress of experimental science is limited by the power of its tools. Ideas

cannot be tested unless the methods are available with which to submit them to the proof of experiment. Consequently, it is to be expected that the phenomenal development of new technical procedures well adapted to the study of living processes should influence profoundly the main currents of research on cancer. Some of these trends of thought are clearly apparent in contemporary patterns. There certainly are others, just beneath the surface, that are unconsciously molding the course of the research of tomorrow. This much is evident. The growing power and sweep of biochemistry is directing increasing attention to the problem of the mechanism of carcinogenesis on the one hand and to the mechanism of action of carcinolytic agents on the other. The former is fundamental to an understanding of the causes of cancer. The latter offers the only hope of establishing a rational basis for the development of chemotherapy.

The biologist, in ever closer cooperation with the biochemist, is sharpening his tools and refining his definitions of first principles as he intensifies his attack on the problem of the origin and multiplication of malignant cells. In this pursuit, he finds that he must cover the whole field of cellular interactions and of the influences of genes, viruses, and hormones on growth, development, and susceptibility to malignant change.

At the clinical level the trend in therapy is strongly toward the development of chemotherapeutic agents for the control of diffuse and inaccessible tumors. At the same time interest is growing in the prevention of cancer by an intensive screening of man's chemical environment in the search for extrinsic carcinogenic agents.

In the final issue, the cancer problem is a biochemical problem. In no degree does this statement detract from the importance of biological studies which do not involve chemical techniques. The relation of hereditary factors to susceptibility to cancer, the transplantability of cancers, the transmission of tumors by filterable agents, the growth of tumor cells in tissue culture, the influence of hormones and of external agents on susceptibility to and growth of tumors, the attempts to develop antibodies

to tumors—all these and many other studies are essential contributions without which biochemists would have nothing to investigate. In the end, however, our objective must be to describe all of these biological phenomena in chemical terms.

A review of the progress in research on cancer during the past decade leaves the strong impression that the problem of cancer is beginning to take definitive shape. The ground has been cleared, there is a common understanding of objectives between a diversity of scientific disciplines, the foundations for a comprehensive experimental attack on the causes and cure of cancer have been well laid, and work is being pressed at an increasing tempo.

The Division finds great satisfaction in the accomplishments of the past eleven years, and in the standing that the program of the Committee on Growth achieved in the eyes of the scientific community. In the face of a trend toward narrowly categorized research, the Committee steadfastly maintained that reliance on, contact with, and support of research in the basic sciences bearing broadly on the whole phenomenon of growth is essential to continued progress in the understanding of human cancer. In the face of a growing urge to direct the course of science from above, it wisely held that the investigator alone can best decide which avenues of research he should explore.

Academy—Research Council Patent Policy Services

ARCHIE M. PALMER

Director, Office of Patent Policy Survey

FOR the past ten years the National Academy of Sciences—National Research Council, through its Office of Patent Policy Survey, has been making surveys of non-profit research and patent management policies and practices and has been rendering advisory and consultative services to universities, the Government and industry on nonprofit research and patent policy problems. The favorable response to the publication of the findings of the surveys and to the assistance given through the advisory and consultative services have indicated the need for such information and guidance in this important field.

Ever since its organization in 1916 the National Research Council has been interested in patent matters as an inevitable corollary of scientific and technological research. In 1917 the United States Commissioner of Patents, with the approval of the Secretary of the Interior, requested the National Research Council to appoint a committee to investigate the Patent Office, which was then a part of the Department of the Interior, and the Patent System, "with a view to increasing its effectiveness and

to consider what might be done to make the Patent Office more of a national institution and more vitally useful to the industrial life of the country."

The committee, appointed in compliance with that request, was composed of William F. Durand, Chairman, Leo H. Baeckeland, M. I. Pupin, Robert A. Millikan, S. W. Stratton, Reid Hunt, Frederick P. Fish, Thomas Ewing, and Edwin J. Prindle. The report of the committee was issued in 1919 as the first publication in the National Research Council Reprint and Circular Series; it is long since out of print.

In 1933 a Committee on Patent Policy was created as a standing committee of the National Research Council, with Karl T. Compton as chairman and Simon Flexner and Archie M. Palmer as the other members, to which were added later that year Robert E. Wilson and Joseph Rossman. Subsequently, through rotation of membership, Frederic W. Willard, G. W. McCoy, Alfred Stengel, William Charles White, Henry A. Barton, Lewis H. Weed, and Howard Poillon served on the Committee.

Between 1933 and 1946 the Committee met periodically; gave continuing consideration to the various aspects of the patent problem in universities, the Government, and industry; and held a number of conferences on the general subject and on specific patent policy questions. Among the significant contributions of the Committee during those years was a conference, held in 1935, on the narcotics discovery of L. F. Small of the University of Virginia, as a result of which advice was given the Government on the handling of that discovery.

The Committee on Patent Policy was reconstituted in 1946 and charged with the sponsorship of a comprehensive survey of the patent policies of universities, colleges, technological institutes, professional schools, and other nonprofit research organizations as a major responsibility. As reconstituted, the Committee was then composed of Frederic W. Willard as chairman, Bruce K. Brown, Conway P. Coe, Gano Dunn, Edward S. Mason, Archie M. Palmer, Lewis H. Weed, and William Charles White.

This survey, the need for which had come to the attention of the National Research Council from a number of directions, was made possible through a generous series of grants from Research Corporation. In August 1946 the Office of Patent Policy Survey was established under the Chairman of the National Research Council, with Archie M. Palmer as director, to conduct the survey, to prepare reports on the findings, and to perform other related activities. The project was originally conceived as a factual survey of significant prevailing practices leading to the publication of the findings.

Undertaken in recognition of the need for information on university research and patent policies, their implications and interrelation, the project was particularly opportune as educational institutions adjusted themselves to postwar conditions. The subsequent expansion of research on the university campus, and especially cooperative and sponsored research supported, under contract or grant, by government agencies and industry, raised many new problems.

To assist university administrators and others concerned with those problems, the original plan of the project has been expanded and made more comprehensive. Monographs on the subject have been published, regional conferences have been held, articles have been written for scientific and professional journals, talks have been given before educational, scientific, and professional organizations, collateral studies of other types of nonprofit research and patent management have been made, advisory and consultative services have been rendered, and the original project has been placed on a continuing basis.

A preliminary report on the findings of a comprehensive survey of the situation then current among the higher educational institutions of the United States and Canada was published in May 1948 under the title "Survey of University Patent Policies." This factual report contained an analysis of significant prevailing practices and presented verbatim statements of 37 formalized university patent policies. The demand for this publication has been so great that it is now out of print.

In furtherance of the program of disseminating information on university research and patent problems five regional conferences were held in Berkeley, Denver, Chicago, New York, and Atlanta during April and May 1949. These regional conferences, which were attended by representatives of both American and Canadian institutions, were designed to provide an opportunity for scientists and administrators to share experiences, to discuss the motivation behind research and patent policies, and to attempt to clarify the principles and considerations involved in the formulation of such policies. In 1949 a summary report on the five conferences was published as "University Research and Patent Problems." This publication also is now out of print.

An interpretive analysis of policies and practices in handling patentable discoveries in the medical and public health field by seventy approved university-affiliated and independent medical schools was published in the Journal of the American Medical Association in June 1948 and subsequently made available as a reprint. Similarly a

report by the director of the Office of Patent Policy Survey on "Industry-Supported University Research," which was published in *Chemical and Engineering News* in July 1948, was made available as a reprint.

In order to keep abreast of the rapidly changing situation and to meet the growing need for current information on the subject, a comprehensive survey was made of the policies and practices of all types of higher educational institutions in the United States and Canada. The findings of that survey were published in November 1952 in a monograph entitled "University Patent Policies and Practices," which not only brought up to date but also expanded the earlier report "Survey of University Patent Policies."

Since the publication of "University Patent Policies and Practices" in 1952 there were so many new research and patent policies adopted and so many changes in institutional practices, especially with respect to contract research and patent management, that the National Research Council was encouraged to survey the situation again and to publish the "Supplement to University Patent Policies and Practices" in 1955. It brought up to date and expanded the material contained in the earlier monograph and also contained a much-needed chapter on considerations in the formulation of research and patent policies.

A companion volume on the "Administration of Medical and Pharmaceutical Patents" was also published in 1955, through a generous grant from the Lasdon Foundation. That monograph contains interpretive analyses of institutional policies and practices, procedures and experiences with respect to the handling of patentable results of scientific research that affect public and individual health, particularly of discoveries and inventions of a medical, pharmaceutical, therapeutic or hygienic nature, in the 90 approved medical schools and the 74 accredited colleges of pharmacy in the United States and Canada, with pertinent excerpts from applicable general university research and patent policies.

The publications emanating from the Office of Patent Policy Survey have been made available for the information and

guidance of university and college administrators, research scientists, government officials, foundations, patent attorneys and others concerned with the conduct, administration and support of nonprofit scientific and technological research and the handling of patentable discoveries and inventions growing out of such research.

A study has also been made of nonprofit research and patent management, with particular reference to the special research organizations and patent management agencies affiliated with educational institutions as well as those operating independently, and four volumes have been prepared on the subject. Two of these volumes, "Nonprofit Research and Patent Management in the United States" and "Nonprofit Research and Patent Management Organization," have been published; the other two are now in production and will be released later this year.

In addition, two special studies have been made of university patent policies, one for the National Institutes of Health and the other jointly for the National Institutes of Health, the Office of Naval Research, and the Department of the Air Force. Reports on these special studies were submitted to the Government agencies concerned in 1951 and 1952 respectively.

For more than five years, from 1950 to 1955, the director of the Office of Patent Policy Survey served as chairman of the Government Patents Board and, as head of that independent agency, was responsible for establishing, coordinating, interpreting, and administering a uniform patent policy for the Government with respect to inventions made by Government employees.

The surveys are made, the publications are issued, and the other services of the Office of Patent Policy Survey are rendered under the sponsorship of the Academy-Research Council Committee on Patent Policy. Since its creation in 1933 the chairmen of the Committee have been: Karl T. Compton (1933-36), Frederic W. Willard (1936-41 and 1945-47), Howard A. Poillon (1941-45), George B. Pegram (1948-54), and Conway P. Coe (1954-). In addition to Chairman Coe the Committee is presently composed of Joseph W. Barker, Robert Gottschalk, and Archie M. Palmer.

SCIENCE NEWS

METAL METABOLISM AND MICROBIOLOGICAL DETERIORATION

On June 1, the Prevention of Deterioration Center presented a symposium sponsored by its Scientific Advisory Committee on the subject of metal metabolism and microbiological deterioration. Although all papers presented were by invitation, each topic was followed by a discussion period to permit the audience to exchange views and interpretations and to clarify controversial points.

The symposium was opened by K. V. Thimann of Harvard University, who pointed out that workers in fields of applied research need occasionally to review the findings of fundamental research scientists in allied disciplines. He said that the purpose of this symposium was to make such a review of a few lines of fundamental research on metal metabolism as these relate to the microorganisms responsible for materials deterioration.

Robert A. Steinberg, U. S. Department of Agriculture, discussed the effects of metals on the growth of fungi with particular emphasis on *Aspergillus niger*. B. G. Vallee, Harvard Medical School, concentrated on the salient role of metals in enzymatic oxidative catalysis, reviewing for the most part studies on zinc enzymes.

W. J. Nickerson, Rutgers University, and Martin Rubin, Georgetown University, presented papers on the subject of metal chelation; the former discussed chelation as it influences development of form in fungi, and the latter summarized means of using chelation to control organisms of deterioration. Harold G. Shirk, Prevention of Deterioration Center, presented data on promising new fungicides, dealing especially with those compounds in which metal chelating ability may have an influence on their activity.

Whereas the previous speakers dealt with organisms which cause deterioration or organic materials, R. L. Starkey, Rutgers University, explored the microorganisms which cause corrosion of metals, reviewing the field to date.

The symposium was closed by W. M. Bejuki, Prevention of Deterioration Center, who reviewed factors other than metal metabolism in the growth of fungi. Emphasis here was on the effects of temperature, relative humidity, and substrate.

Briefs of the papers presented will be gathered together as a single publication and made available at a later date.

CONFERENCE ON LINEAR ALGEBRAS

Twenty-three mathematicians participated in a 3-day Conference on Linear Algebras sponsored by the Division of Mathematics, at Rams Head Inn, Shelter Island, N. Y., June 6-8. Arrangements for the conference were made by the organizing committee composed of A. A. Albert, Chairman, Richard Brauer, Nathan Jacobson, and Irving Kaplansky.

This was the third in a series of scientific conferences on mathematics conducted by the Division since 1952. The Conference on Partial Differential Equations was held in October 1952, and the Conference on Operator Theory and Group Representations, in October 1953. There was no conference planned for 1954 because the International Congress of Mathematicians met in Amsterdam in September of that year.

The subjects discussed at the Conference on Linear Algebras included associative algebras and rings, power-associative algebras, Lie algebras, and homological algebra. About half a day was spent on each subject with a program of prepared talks and formal panel discussions.

Prepared papers were delivered by the following mathematicians:

- A. A. ALBERT, University of Chicago
REINHOLD BAER, University of Illinois
RICHARD BRAUER, Harvard University
D. A. BUCHSBAUM, University of Chicago
HARISH-CHANDRA, Columbia University
G. P. HOCHSCHILD, University of Illinois
NATHAN JACOBSON, Yale University
IRVING KAPLANSKY, University of Chicago
ERWIN KLEINFELD, Ohio State University
G. B. SELIGMAN, Princeton University
J. T. TATE, Harvard University.

INTERNATIONAL CONFERENCE ON SCIENTIFIC INFORMATION

An International Conference on Scientific Information is to be held in Washington, D. C., sometime in 1958. The conference is being sponsored by the American Documentation Institute, the National Academy of Sciences-National Research Council, and the National Science Foundation. The sponsors believe that the mass of research results being published is overtaxing the existing facilities for organizing scientific information. The purpose of the conference is to provide an opportunity for a thorough discussion of the status of research on scientific information problems and methods of solving them.

A preliminary Planning Committee has been established with the following membership:

MILTON O. LEE, Federation of American Societies for Experimental Biology, *Chairman*
ALBERTO THOMPSON, National Science Foundation, *Executive Secretary*
SCOTT ADAMS, National Institutes of Health
ROBERT S. BRAY, Library of Congress
HELEN BROWNSON, National Science Foundation
CHARLES I. CAMPBELL, National Academy of Sciences-National Research Council
VERNER W. CLAPP, Library of Congress
J. E. CUMMINS, Australian Scientific Liaison Office
JOHN C. GREEN, U. S. Department of Commerce
JOSEPH HILSENRATH, National Bureau of Standards
WILLIAM T. MASON, Office of Strategic Information
COL. FRANK B. ROGERS, Armed Forces Medical Library
MARY E. STEVENS, National Bureau of Standards
MORTIMER TAUBE, Documentation, Inc.

A detailed and formal review of the plans and agenda for the conference will be carried out by an ad hoc committee at a meeting to be held in the fall of this year. The conference committee, appointed by the Academy-Research Council, will be composed of distinguished individuals who are actively concerned with the problems of scientific information and who are qualified to review and assist in the development of the program.

According to present plans, approximately 150 foreign and United States experts in all fields involving the organization and dissemination of scientific information will be invited to participate in the Conference. In addition to the active partici-

pants, arrangements will be made for those with an interest in the problem to attend as observers.

All papers will be printed and distributed in advance so that they need not be read at the conference. Instead, they will be discussed in detail by review panels and the invited participants.

Readers are invited to submit their suggestions as to topics and contributors. These should be addressed to the Office of the Executive Secretary, International Conference on Scientific Information, National Academy of Sciences-National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

ANNUAL MEETING DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH

The annual meeting of the Division of Engineering and Industrial Research was held at the Academy-Research Council building, May 28, with over 50 persons in attendance. Charles I. Campbell, Assistant to the Executive Officer of the Academy, reviewed the highlights of the Academy-Research Council activities for the past year, and C. F. Rassweiler, Chairman of the Division, presented the highlights of Division activities. There was a general discussion of the desirability of encouraging the Committees of the Division to resist undue narrowing of their field of research. W. J. Youden, who has been working with the Committee on Ship Steel and is a member of the Statistical Panel of the AASHO Road Test, spoke on statistical design and statistical analysis in engineering research programs.

Activities of the Division's newest committees were presented in some detail. A. A. Brown, of the U. S. Forest Service and a member of the Committee on Fire Research, described the work on fire research and presented a colored motion picture "Operation Firestop" which vividly illustrated methods of forest fire fighting, including the aerial delivery of fire fighters and fire extinguishing materials. The type of research being carried out by the Committee on Aerial Delivery Research was ably reported by Raymond Stevens, Chairman of the Advisory Board on Quarter-

master Research and Development, and E. C. Mitchell, Chairman of the Committee. The organization and objectives of the Committee on Urban Research were outlined by E. Willard Dennis, Chairman of the Committee, and Joseph L. Intermaggio, the Executive Secretary.

The Division elected the following members to serve on the Executive Committee for 1956-57:

PAUL D. FOOTE, formerly with Gulf Oil Corporation and Gulf Refining Company

A. J. HERZIG, Climax Molybdenum Corporation of Michigan

RICHARD C. JORDAN, Department of Mechanical Engineering, University of Minnesota

BURTON W. MARSH, Director of Traffic Engineering and Safety, American Automobile Association

THOMAS H. MILLER, Acting Director, U. S. Bureau of Mines

HAROLD S. OSBORNE, formerly with American Telephone and Telegraph Company

ERIC A. WALKER, President, Pennsylvania State University.

The following persons were elected members-at-large of the Division for three-year terms:

EDMUND CLAXTON, Armstrong Cork Company

RICHARD C. JORDAN, University of Minnesota

MARTIN MASON, George Washington University

The Society of Photographic Engineers, recently invited to be a cooperating society of the Academy-Research Council, was represented at the Division meeting by Edward K. Kaprelian, Consultant in Photographic and Optic Research and Development.

Dr. Rassweiler announced that Edgar C. Bain, Assistant Executive Vice President of the U. S. Steel Corporation, would become Chairman of the Division on January 1, 1957. Dr. Bain will serve as Chairman-Designate until the end of 1956.

GRANTS IN AID OF MEDICAL RESEARCH

In addition to its advisory services to governmental and private agencies in the evaluation of research proposals, the Division of Medical Sciences administers four programs of grants-in-aid of research in the following specialized fields:

1) *Radiology*. Acting for the James Picker Foundation, the Committee on

Radiology awards research grants, scholar grants, and fellowships in the field of radiology (*see News Report*, Vol. 6, No. 3, p. 49). In line with the interests of the Foundation, the grant program is oriented toward, but not necessarily limited to, the diagnostic aspects of the field.

2) *Alcohol*. The committee on Problems of Alcohol administers funds provided by the Licensed Beverage Industries, Inc., for support of research on the physiological, biochemical, and pharmacological effects of alcohol.

3) *Drug Addiction*. The Committee on Drug Addiction and Narcotics receives support from a number of interested pharmaceutical manufacturers for research projects in the fields of analgesia and addiction.

4) *Sex Research*. For more than three decades, the Rockefeller Foundation has supported the program of the Committee for Research in Problems of Sex. The Committee at present is making a special effort to encourage research on the behavioral aspects of the problem in man and in the higher vertebrates.

The four committees mentioned above reviewed 110 applications during the past year and awarded 43 grants for 1956-57. These included 7 grants in radiological research, 14 in alcohol research, 4 in drug addiction, and 18 in sex research. The total commitment for research grants in the four fields is \$156,700 for the coming year.

FIRE RESEARCH CORRELATION CONFERENCE

The Committee on Fire Research and the Fire Research Conference of the Division of Engineering and Industrial Research is planning a research correlation conference to be held at the Academy-Research Council building late in October or November.

Attendance at the Conference will be by invitation. Those actively interested in basic research on fire and the spread and growth of fire should indicate their interest and request advance registration cards. Address all communications to D. W. Thornhill, Executive Secretary, Committee on Fire Research and Fire Research Conference, National Academy of Sciences, Washington 25, D. C.

COMMITTEE ADVISORY TO OOR

The Academy-Research Council announces the following new appointments, each for a three-year term, to the Committee Advisory to the Office of Ordnance Research (OOR):

Chemistry:

ROBERT B. CARLIN, Carnegie Institute of Technology
PAUL C. CROSS, University of Washington
PAUL H. EMMETT, Johns Hopkins University
CARL G. NIEMANN, California Institute of Technology

Engineering:

CHARLES S. BARRETT, University of Chicago
DANIEL C. DRUCKER, Brown University
HAROLD A. OHLGREN, University of Michigan

Mathematics:

NATHAN JACOBSON, Yale University
ROBERT F. RINEHART, Case Institute of Technology
NORMAN E. STEENROD, Princeton University

Physics:

BERNARD T. FELD, Massachusetts Institute of Technology
PAUL D. FOOTE, formerly with Gulf Research and Development Company

Effective July 1, Dr. Foote succeeded R. C. Gibbs as Chairman of the Committee. With the addition of the new members listed above the total membership of the Advisory Committee is now 25.

INTERNATIONAL GEOGRAPHICAL CONGRESS

The Ninth General Assembly and Eighteenth Congress of the International Geographical Union will be held in Rio de Janeiro, August 9-18. Geographers from more than 40 countries will be present.

Information received from the Brazilian Organizing Committee states that the 11 Commissions of the Union will meet during the General Assembly and that scientific papers will be presented at 13 sectional meetings covering all fields of geography. In addition, there will be pre-Congress and post-Congress excursions to many parts of Brazil. A geographical and cartographical exhibit is also planned.

Approximately 100 geographers from the United States will attend the meetings in Rio de Janeiro. At the invitation of the Brazilian Government, the U. S. Department of State has appointed a United

States Delegation to the General Assembly of the Union and the President of the National Academy of Sciences has appointed a delegation to the Congress. The composition of the Academy-Research Council delegation, which includes the delegates designated by the Department of State, is as follows:

- *WALLACE W. ATWOOD, JR., National Academy of Sciences, *Chairman*
- LEO ALPERT, Army Map Service, U. S. Corps of Engineers
- ROLLIN S. ATWOOD, International Cooperation Administration
- JAMES BRAMMELL, Washington, D. C.
- WILLIAM BRUESEMEISTER, American Geographical Society
- ARTHUR L. BURT, U. S. Department of State
- ROBERT L. CARMIN, University of Illinois
- GEORGE B. CRESSEY, Syracuse University
- SIDNEY E. EBELAW, University of Kansas
- NORDIS A. FELLAND, American Geographical Society
- *ARCH C. GERLACH, Library of Congress
- EDWIN J. FOSQUE, Southern Methodist University
- *CHAUNCY D. HARRIS, University of Chicago
- *CHARLES B. HITCHCOCK, American Geographical Society
- *PRESTON E. JAMES, Syracuse University
- *CLARENCE F. JONES, Northwestern University
- GEORGE KISH, University of Michigan
- LESTER E. KLIMM, University of Pennsylvania
- CLARA EGLI LE GEAR, Library of Congress
- PEVERIL MEIGS, U. S. Army Quartermaster Research and Development Command
- ROBERT MOORE, National Geographic Society
- JAMES J. PARSONS, University of California at Berkeley
- EVELYN L. PRUITT, Office of Naval Research
- ERWIN RAISZ, Cambridge, Massachusetts
- INA CULLOM ROBERTSON, North Dakota State Teachers College
- *RICHARD J. RUSSELL, Louisiana State University
- SAMUEL VAN VALKENBURG, Clark University

*United States delegate to the General Assembly.

NEW APPOINTMENTS DIVISION OF EARTH SCIENCES

Harry H. Hess, Professor of Geology at Princeton University, has been appointed Chairman of the Division of Earth Sciences for a two-year period beginning July 1 (*see NEWS REPORT*, Vol. IV, No. 4, p. 69). Dr. Hess succeeds Richard J. Russell of Louisiana State University, who will serve as Past-Chairman.

John N. Adkins, Office of Naval Research, has been appointed Chairman-Designate of the Division to serve with Dr.

Hess for the two-year period, 1956-58. Dr. Adkins received his Ph.D. degree in seismology from the University of California in 1939. During 1941-45 he was a staff member of the war research division of Columbia University and from 1945-46 was supervisor of the antenna section, Airborne Instruments Laboratory, Inc. From 1946 to 1948 he was assistant professor of geophysics at Massachusetts Institute of Technology. Since that time he has been with the Office of Naval Research, where he is Director of the Earth Sciences Division. Dr. Adkins is especially interested in earthquake travel times and the crustal structure of the earth.

ANNUAL MEETING DIVISION OF MATHEMATICS

The annual meeting of the Division of Mathematics was held Saturday, May 19, at the Academy-Research Council building. Twenty-eight members and guests attended the meeting.

Following the report of the chairman, Paul A. Smith, on the major activities of the Division, there were brief reports from the liaison members and remarks by S. Douglas Cornell, Executive Officer of the Academy, on the over-all activities of the Academy-Research Council.

The invited speakers and their topics were:

- 1) F. J. Weyl, Office of Naval Research, "Report on the New ONR Research Associateships in Mathematics;"
- 2) A. A. Albert, University of Chicago, "Preliminary Report on the Survey of Research Potential and Training in the Mathematical Sciences;" and
- 3) S. S. Cairns, University of Illinois, "A Review of the Educational Problem."

LECTURE BY P. W. BRIDGMAN

The last lecture in the Academy-Research Council series for 1955-56 was presented by P. W. Bridgman, Higgins University Professor emeritus of Harvard University, on Tuesday, April 10. Dr. Bridgman chose for his subject "Science and Broad Points of View." The complete lecture has been published in the Proceedings of the Academy, Vol. 42, No. 6, pp. 315-325, June 15, 1956.

ANTHROPOLOGY AND PSYCHOLOGY

Clyde Kluckhohn, Laboratory of Social Relations, Harvard University, has been appointed Chairman of the Division of Anthropology and Psychology for a two-year term. Harry F. Harlow, Chairman of the Division for the past two years will continue his association with the Division as Past-Chairman. In addition to Dr. Kluckhohn and Dr. Harlow, Delos D. Wickens, Ohio State University, and Richard B. Woodbury, Columbia University, were appointed members of the Executive Committee.

The following members of the Division were appointed for a three-year term:

Anthropologists:

CORA DU BOIS, Harvard University
MARSHALL T. NEWMAN, U. S. National Museum
(member-at-large)
A. LAURISTON SHARP, Cornell University
CHARLES WAGLEY, Columbia University

Psychologists:

DAVID A. GRANT, University of Wisconsin
ROBERT B. MACLEOD, Cornell University
RICHARD L. SOLOMON, Harvard University

INTERNATIONAL EXCHANGE OF PERSONS

The Conference Board Committee on International Exchange of Persons has announced the regular 1957-58 competition for university lecturing and advanced research awards under the Fulbright Act in Europe, the Near East, Japan, and Chile. October 1, 1956, is the closing date for making application. Detailed program information and application forms may be obtained from the Committee on International Exchange of Persons, 2101 Constitution Avenue, Washington 25, D. C.

On August 15 the Committee issued a special announcement concerning 1957-58 programs in India, Pakistan, Ceylon, Thailand, Egypt, and Iraq. The applications for these countries, too, should be made by October 1.

In addition to recommending candidates for awards under the Fulbright Act, the Committee recommends candidates for lecturing abroad under the Smith-Mundt Act. Smith-Mundt lectureships are offered in approximately thirty countries, which are not participants in the Fulbright Pro-

gram, in Latin America, the Near East, Africa, the Far East, and Europe. Since requests for visiting professors under the Smith-Mundt Program are forwarded to the Committee at intervals throughout the year, the Committee does not conduct regular competitions but instead invites interested persons to fill out brief data sheets for inclusion in a register which is consulted not only for candidates under the Smith-Mundt Program but also for lecture-ships which remain unfilled under the Fulbright and other programs. Data sheets may be obtained from the Committee.

STAFF APPOINTMENTS

The Office of International Relations announces the appointment of **André C. Simonpietri** as Associate Director of the Office effective July 16. Prior to accepting this appointment Dr. Simonpietri served for 5 years as Secretary-General of the Pan American Institute of Geography and History, a specialized agency of the Organization of American States with headquarters in Mexico.

Dr. Simonpietri, a native of Virginia, spent many of his student years in Europe. He received his Ph. D. degree in psychology from Università Urbana, Rome, in 1935. He joined the U. S. Department of State in 1938 where he served as a member of the staff of the Division of International Conferences. From 1942 to 1945 he was loaned by the Department to assist different international organizations and in 1945 was named Special Adviser in the Office of the Geographer. In this capacity he served as departmental representative to the Joint Chiefs of Staff on bilateral and multilateral scientific agreements and came to know first hand many of the international organizations concerned with science.

The Highway Research Board has announced the appointment of **Herbert P. Orland** as Editor of the Board's publications effective June 1956. Mr. Orland is a graduate of Cornell University and a civil engineer by profession. He began his editorial work in 1944 when he became Assistant Editor of *Engineering News-Record*. Just before coming to the Academy-Research Council, he was Managing Editor

for the Scranton Publishing Company of Chicago. Mr. Orland replaces **Walter J. Miller**, who is now working for the U. S. Department of Defense.

Harold G. Shirk was appointed Assistant Director of the Prevention of Deterioration Center effective July 1. Dr. Shirk obtained his Ph.D. degree in plant physiology from the University of Maryland in 1938. In 1946 he joined the staff of the Center as a Research Associate and in the intervening years has concentrated on the field of fungicide screening.

The Division of Physical Sciences announces that **Masami Yamadi** has joined the staff of the Nuclear Data Project as a Professional Associate. Dr. Yamadi received his D.Sc. degree in theoretical physics from the University of Tokyo this year and came to the Academy-Research Council under the Exchange-Visitor's Program of the U. S. Department of State.

The U. S. National Committee for the International Geophysical Year (IGY) has announced the appointment of **J. Gilman Reid, Jr.**, as Head of the Office for the Earth Satellite Program. Mr. Reid is a graduate of the University of Mississippi, where he majored in physics and mathematics. He worked for the National Bureau of Standards for many years and was employed by A.C.F. Electronics, Inc., before joining the IGY staff.

The Executive Office announced the appointment of **Josephine Andoe Williams** as Director of Publications effective August 1, 1956. Mrs. Williams has been with the Academy-Research Council for two and one-half years as Assistant Director of Publications. Charles I. Campbell who has held the position of Acting Director of Publications since 1953 will remain on the staff in his capacity as Assistant to the Executive Officer.

The Executive Office has announced the appointment of **Mary Sheppard** as Assistant to the Executive Secretary for the International Conference on Scientific Information. Mrs. Sheppard has been affiliated with the American Association for the Advancement of Science as Book Review Editor and prior to this was an editorial assistant on the journals of the American Physiological Society.

The Maritime Cargo Transportation Conference announces the appointment of **Brig. Gen. Ralph I. Glasgow**, U. S. Army (ret.), as Transportation Consultant effective July 1. Gen. Glasgow is a West Point graduate and a specialist in transportation and logistics. Before his retirement, he served as Commanding General, San Fran-

cisco Port of Embarkation; Senior Instructor in Logistics, Army and Navy Staff College; Chief of Service Division, Logistics, Army General Staff, and Military Attaché, London, England. Gen. Glasgow replaces **Col. Robert A. Cliffe**, U. S. Army, who has been assigned to Chief of Staff, Transportation Center, Fort Eustis, Va.

FELLOWSHIP PROGRAMS

AWARD OF FELLOWSHIPS IN CANCER RESEARCH

The American Cancer Society, upon recommendation of the Committee on Growth of the Division of Medical Sciences, has awarded 51 fellowships in cancer research for the academic year 1956-57. Two of these are British-American Exchange Fellowships and one a Swedish-American Exchange Fellowship. The recipients of the fellowships will study in 24 institutions in the United States, and 12 foreign laboratories.

The following list indicates the institution from which the appointees received their doctorate, as well as the nature and location of their fellowship research.

American Cancer Society Fellowships in Cancer Research

Thomas T. Amatruda, Jr. (M.D., Yale University, 1951)

Effect of pituitary factors on fatty acid metabolism—Duke University, with F. L. Engel.

Irwin Berman (Ph.D., New York University, 1955) Effects of ionizing radiation combined with endocrine alterations on the phosphorus metabolism and morphology of bone marrow—Stanford University School of Medicine, with Henry S. Kaplan.

Emil O. Bernstein (Ph.D., University of California at Los Angeles, 1956)

Some chemical and physical changes occurring in a synchronously dividing culture of chlamydomonas—University of California at Los Angeles, with Theodore Jahn.

George E. Brosseau, Jr. (Ph.D., University of California at Berkeley, 1956)

The role of the centromere and the proximal heterochromatin in crossing over variability in *Drosophila melanogaster*—Oak Ridge National Laboratory, with Edward Novitski.

Clark Bublitz (Ph.D., University of Chicago, 1955) Oxidative phosphorylation—Johns Hopkins University, with A. L. Lehninger.

Mary E. Carsten (Ph.D., New York University, 1951)

Thyrotropic hormone; purification and structural studies—University of California at Los Angeles, with W. H. Griffith and John G. Pierce.

Jackson J. Clemons (Ph.D., University of Wisconsin, 1955)

Quantitative cytology and cytopathology: Reaction of cells to biological, chemical, and physical agents—Western Reserve University, with Cecilia Leuchtenberger.

Phin Cohen (M.D., University of Maryland, 1952) Function of the reticulo-endothelial system in red cell destruction—Peter Bent Brigham Hospital, with Frank Gardner.

Andrew De Rocco (Ph.D., University of Michigan, 1956)

Physical chemical studies on D.N.A.—University of Michigan, with Cyrus Levinthal.

James T. Dowling (M.D., Harvard Medical School, 1952)

Metabolic determinants of the peripheral utilization of thyroid hormone—Thorndike Memorial Laboratory, with William B. Castle.

Howard Ehrlich (Ph.D., University of Minnesota, 1956)

Electron microscope studies of the pollen walls of *Saintpaulia wendl.*—University of Minnesota, with A. Orville Dahl.

Irving Finger (Ph.D., University of Pennsylvania, 1955)

Immunochemical studies of the antigens of *Paramecium aurelia*—Columbia University, with Elvin A. Kabat.

Edward Glassman (Ph.D., New York University, 1955)

Metabolism of aromatic compounds—California Institute of Technology, with H. K. Mitchell.

Gerard E. Graf (Ph.D., Iowa State College, 1956)

Biochemical studies on *Drosophila* mutants—University of Zürich, Switzerland, with Ernst Hadorn.

Hans E. Gruen (Ph.D., Candidate, Harvard University, February 1957)

The control of sporangiophore growth in *Phycomyces*—Harvard University, with Kenneth V. Thimann.

- Philip E. Hartman (Ph.D., University of Pennsylvania, 1953)
Nucleo-cytoplasmic interactions controlling metabolic capabilities and responses of the cell—University of Brussels, Belgium, with Jean Brachet.
- Daniel D. Hendley (Ph.D., University of Chicago, 1954)
Photometabolism of butyrate and acetate in purple bacteria—University of Sheffield, England, with S. R. Elsden.
- Leonard A. Herzenberg (Ph.D., California Institute of Technology, 1955)
The first steps of induction of β -galactosidase: Mechanism of the fixation of inducers—Institut Pasteur, Paris, France, with Jacques Monod.
- Barbara Beaman Jacobs (Ph.D., Indiana University, 1956)
The role of the internal secretions in tumor initiation and growth, with special reference to the pituitary and thyroid hormones—University of Colorado Medical Center, with Robert A. Huseby.
- Karl B. Jacobson (Ph.D., Johns Hopkins University, 1956)
Interaction of metal ions with certain compounds of biochemical interest—California Institute of Technology, with Linus Pauling.
- David P. Jacobus (M.D., University of Pennsylvania, 1953)
Thermal neutron therapy for metastatic tumors—University of Pennsylvania, with Dale R. Coman.
- Christine D. Jardetzky (Ph.D., University of Minnesota, 1955)
The type of bond formed by magnesium, manganese, and cobalt ions with biological polymers, in relation to catalytic activity—California Institute of Technology, with Linus Pauling.
- Andrew S. Kende (Ph.D., Harvard University, 1956)
Biogenetic syntheses by phenol oxidation—University of Glasgow, Scotland, with D. H. R. Barton.
- Allen Kropf (Ph.D., University of Utah, 1954)
The nature of lumi- and meta-rhodopsin, intermediates in the bleaching of rhodopsin—Harvard University, with George Wald.
- Seymour Lederberg (Ph.D., University of Illinois at Urbana, 1955)
Chromosomal and nuclear functions—University of California at Berkeley, with Daniel Mazia.
- Israel R. Lehman (Sc.D., Johns Hopkins University, 1954)
Biological mechanisms of pyrimidine methylation and hydroxymethylation—Washington University, with Arthur Kornberg.
- Donald J. McCorquodale (Ph.D., University of Wisconsin, 1955)
The mechanism of estrogen activity on protein synthesis with particular emphasis on the carboxyl group activation of amino acids—University of Wisconsin, with Gerald C. Mueller.
- John T. McQuate (Ph.D., Indiana University, 1951)
Metabolic inter-relationships of soluble and integrated cellular components—Western Reserve University, with Merton F. Utter.
- Robert L. Metzenberg, Jr. (Ph.D., California Institute of Technology, 1955)
Biosynthesis of citrulline—University of Wisconsin, with P. P. Cohen.
- Frederick C. Neidhardt (Ph.D., Harvard University, 1956)
The growth of micro-organisms and their biosynthesis of inducible enzymes—Institut Pasteur, Paris, France, with Jacques Monod.
- Melvin Perleman (Ph.D., Rice Institute, 1956)
Steriod components of tumor tissues—Eidgenössische Technische Hochschule, Zürich, Switzerland, with L. Ruzicka and R. Anliker.
- John H. Phillips, Jr. (Ph.D., University of California at Berkeley, 1955)
Immune mechanisms of marine invertebrate animals—Hopkins Marine Station, with Donald P. Abbott.
- Bernard Pirofsky (M.D., New York University, 1950)
An investigation into the cytophysiology of leukemic leukocytes—University of Oregon, with Edwin E. Osgood.
- Henry C. Pitot, III (M.D., Tulane University School of Medicine, 1955)
Metabolism of one-carbon units and protein synthesis during tumor formation—Tulane University, with Emmanuel Farber.
- Alfred M. Prince (M.D., Western Reserve School of Medicine, 1955)
The "masking phenomenon" of Rous sarcoma viruses—Yale University, with F. Duran-Reynals.
- Vernon W. Proctor (Ph.D., University of Missouri, 1955)
Isolation and identification of antibiotics from freshwater algae—Yale University, with G. Evelyn Hutchinson.
- Ilse D. Raacke (Ph.D., University of California, at Berkeley, 1954)
Nucleotides and other N-glycosides in relation to protein synthesis—University of Cambridge, England, with Sir Alexander R. Todd.
- Willard D. Roth (Ph.D., Harvard University, 1955)
Cytology and physiology of the hypothalamic-hypophyseal system in the lampreys; effects of age on various secretory cells of the brain—Harvard Medical School, with G. B. Wislocki.
- Moselio Schaechter (Ph.D., University of Pennsylvania, 1954)
Cytological and biochemical studies on single step growth cycles and cell division in bacteria—State Serum Institute, Copenhagen, Denmark, with Ole Maaløe.
- Verne N. Schumaker (Ph.D., University of California, at Berkeley, 1955)
Kinetics of the enzyme penetration—University of Brussels, Belgium, with J. Brachet.

David G. Shapirio (Ph.D., Harvard University, 1955)

Biochemical mechanisms underlying active ion transport in arthropods, with special reference to respiratory enzymes—University of Louvain, Belgium, with H. J. Koch.

Jean E. Small (Ph.D., Brown University, 1956)

The differentiation of re-aggregated tissue cells following dissociation and chemical treatment—Brown University (June 1, 1956–August 31, 1956), with J. W. Wilson and M. V. Edds, Jr.; and Yale University (September 1, 1956–May 31, 1957), with J. P. Trinkaus.

Robert C. Spiro (M.D., State University of New York College of Medicine, 1955)

The influence of hormones on carbohydrate metabolism in mammalian tissue slices using C^{14} labeled substrates—Harvard Medical School, with A. Baird Hastings.

George Taborsky (Ph.D., Yale University, 1956)

Oxygen exchange between water and synthetic substrates as catalyzed by subtilisin—Carlsberg Laboratory, Copenhagen, Denmark, with K. Linderström-Lang.

Irwin Tessman (Ph.D., Yale University, 1954)

Bacteriophage and host cell reproduction—Cornell University, with Philip Morrison.

Donald F. H. Wallach (M.D., Harvard Medical School, 1953)

Mechanisms of invasiveness of malignant tumors—Harvard University and Peter Bent Brigham Hospital, with Jacob Furth.

James W. Woods (Ph.D., Johns Hopkins University, 1954)

Central nervous control of anterior pituitary (with particular emphasis upon telencephalic influences upon the secretion of tropic hormones)—Maudsley Hospital, London, England, with G. W. Harris.

Lillian Israel Memorial Fellowship in Cancer Research

Raymond J. Timmerman (M.D., University of Cincinnati College of Medicine, 1951)

Integration of emotional and hormonal disturbances upon the stomach—Harvard Medical School, with Seymour J. Gray.

British American Exchange Fellowship in Cancer Research

Robert L. Berger (Ph.D., Pennsylvania State University, 1955)

The kinetic and equilibrium constants of the oxyhemoglobin intermediates—Cambridge University, England, with F. J. W. Roughton.

Mortimer L. Mendelsohn (M.D., Harvard Medical School, 1948)

Mechanism of action of ionizing radiations on human tumours, experimental tumours in animals, and normal cells, by means of ultraviolet photomicrography with quantitative photometry—Cambridge University, England, with Joseph S. Mitchell.

Swedish-American Exchange Fellowship in Cancer Research

Thomas E. Thompson (Ph.D., Harvard University, 1955)

The optical properties of the modified Rayleigh Diffusometer, and the siphoning procedure for forming the initial boundaries—L. K. B. Laboratory, Stockholm, Sweden, with H. Svensson,

FELLOWSHIPS IN PHYSIOLOGICAL PSYCHOLOGY

In 1955 the National Academy of Sciences-National Research Council inaugurated a senior postdoctoral fellowship program in physiological psychology. These awards, which are limited in number, are supported by the Carnegie Corporation of New York and are administered by the Academy-Research Council.

The principal objective of this program is to stimulate wider development and correlation of knowledge in the area of physiological psychology. They are intended to enable young psychologists to spend one or two years in an environment where physiological research is in progress and where contact with nonpsychologists, expert in their own fields, will be maximized.

Of equal importance will be the support of young physiologists who wish to spend the period of their fellowships in a working relationship with psychological investigators.

The following candidates were awarded fellowships for the 1956–57 academic year:

Conrad G. Mueller (Ph.D., Columbia University, 1948)

Research on physiological mechanisms in vision, acquiring additional techniques for the micro-pipette method of recording from single-sense cells and employing other techniques for working with the vertebrate retina—Rockefeller Institute for Medical Research, with H. K. Hartline.

Richard M. Warren (Ph.D., New York University, 1951)

Researches on perceptual processes—New York University College of Medicine, with Hans-Lukas Teuber.

Francis A. Young (Ph.D., Ohio State University, 1949)

Research on neurophysiological and biophysical phenomena effecting behavior—University of Washington School of Medicine, with T. C. Ruch.

GRANTS FOR SCHOLARS IN CANCER RESEARCH

The American Cancer Society, upon recommendation of the Committee on Growth, has awarded seven new 3-year grants and four 2-year renewals, effective July 1, 1956, for support of the following scholars in cancer research:

- Herbert M. Hirsch (Ph.D., University of Illinois, 1951)
Cellular and subcellular mechanisms in relation to neoplasia—Division of Cancer Biology, University of Minnesota.
- Mahlon B. Hoagland (M.D., Harvard Medical School, 1948)
A Study of the mechanism of protein synthesis—Department of Medicine, Harvard Medical School (renewal for two years).
- Howard Holtzer (Ph.D., University of Chicago, 1952)
Analysis of cellular differentiation—Department of Anatomy, University of Pennsylvania.
- Leonard S. Lerman (Ph.D., California Institute of Technology, 1949)
The function of the nucleic acids in cellular genetics—Department of Biophysics, University of Colorado.
- John Walley Littlefield (M.D., Harvard Medical School, 1947)
Mechanisms of protein synthesis in normal and malignant cells—Department of Medicine, Harvard Medical School.

Jane Harting Park (Ph.D., Washington University, 1952)

Studies on oxidative phosphorylation—Department of Physiology, Vanderbilt University.

Alvin F. Rieck (Ph.D., Princeton University, 1952)
Abnormal differentiation of developing and regenerating systems produced by ultraviolet and other carcinogens—Department of Physiology, Marquette University (renewal for two years).

David A. Salzberg (Ph.D., Stanford University, 1950)

Riboflavin-azo dye relationships in azo dye carcinogenesis—Cancer Department, Palo Alto Medical Research Foundation (renewal for two years).

T. T. Tchen (Ph.D., University of Chicago, 1954)
The stereochemistry of some enzymatic reactions—Department of Chemistry, Harvard University.

Bernard Zimmerman (M.D., Harvard University, 1945; Ph.D., University of Minnesota, 1948)
Studies of endocrine physiology and metabolic balance in relation to clinical cancer and cancer surgery—Department of Surgery, University of Minnesota (renewal for two years).

Norton D. Zinder (Ph.D., University of Wisconsin, 1952)

Genetic relationships between viruses and their host cells—Departments of Pathology and Microbiology, Rockefeller Institute for Medical Research.

RECORD OF MEETINGS

May

- 1 Sub-Panel on Materials for use above 1700° F.
Committee on Fire Research
- 2 USA National Committee, International Scientific Radio Union
- 3 Committee on Primary Records, *Chicago*
Conference Board of Associated Research Councils
- 4 Committee on Problems of Alcohol
Committee on Military Psychology, *St. Louis*
- 7 Committee on Dentistry
Panel on Non-Ferrous Metals
- 8 Conference Committee on Nicaro Research, *Columbus, Ohio*
Nuclear Data Group
International Conference of Scientific Information, Planning Committee
- 9 Panel on Semi-Conductors
Agricultural Research Institute, Program Committee, *East Lansing, Mich.*

May

- 9-10 Subcommittee on Dairy, Oil and Fat Products, *Chicago*
Maritime Cargo Transportation Conference, Steering Committee
Subcommittee on Shock and Panel on Plasma, Joint Meeting
Division of Biology and Agriculture, Executive Committee
Biology Council, Subcommittee on Adult Education, *Philadelphia*
Ad hoc Committee on Coal-Tar Dyes,
Subcommittee on Trauma
Division of Biology and Agriculture, Annual Meeting
Committee on Soils-Calcium-Chloride Roads, *Wilmington, Del.*
USA National Committee, International Union Against Cancer
Subcommittee on Stress
Subcommittee on Waste Disposal
Subcommittee on Radiobiology, *Highland Park, Ill.*

May 15	Committee on Over-All Coordination of the Conference on Pharmacotherapy in Mental Illness International Conference on Scientific Information, Planning Committee	May 31	Prevention of Deterioration Center, Scientific Advisory Committee, Annual Meeting Committee on Manpower Advisory to the Office of Scientific Personnel
16	Subcommittee on Tuberculosis Panel on Adhesives	June 1	Subcommittee on Beta and Gamma Ray Measurements
17-18	Advisory Board on Education Highway Research Board, Department of Economics, Finance, and Administration		Conference on Metal Metabolism and Microbiological Deterioration
18	Subcommittee on Food Supply Committee on Naval Medical Research Committee on Medicine and Surgery Division of Medical Sciences, Executive Committee	4	Fire Research Conference Subcommittee on Vector Control
19	Division of Medical Sciences, Annual Meeting Division of Mathematics, Annual Meeting	4-12	International Conference on Scientific Information, Planning Committee
20	Subcommittee on Cereal and Baked Products, <i>New York City</i>	5	Subcommittee on Atmospheric and Industrial Hygiene
20-23	Building Research Institute, 5th Annual Meeting, <i>Niagara Falls, Canada</i>		Symposium on Gene Action in Relation to Development, Developmental Biology Conference Series, <i>Cold Spring Harbor, N. Y.</i>
21	Conference on Procurement of Animals from Nature	5-6	Panel on Plastics
21-22	Conference Committee on National Lead, <i>Fredericktown, Mo.</i>	6	Committee on Sanitary Engineering and Environment
22	Institute of Animal Resources, Conferences on Standardization and Accreditation	6-8	Subcommittee on Anesthesia
23	Nuclear Data Group Institute of Animal Resources, Governing Board Subcommittee on Subsistence Packaging, <i>Chicago</i>	7	Panel on Titanium Sheet Rolling
	Conference with Porter Bros. Mallinckrodt Chemical Works, <i>St. Louis</i>	7-8	Building Research Advisory Board, Government Advisors
	Federal Construction Council, Task Group on Testing of Paints	8	Conference on Linear Algebras, <i>Shelter Island, N. Y.</i>
24	Advisory Committee on Civil Defense	9	Panel on Elastomers
25	Panel on Dielectrics	10	Committee on International Exchange of Persons
26	Subcommittee on Poultry Nutrition, <i>Chicago</i>	11	Committee on Geography Advisory to U. S. Department of State (PAIGH)
26-27	Division of Physical Sciences, Annual Meeting	11-12	National Advisory Committee for AASHO Road Test, <i>LaSalle, Ill.</i>
28	Biology Council, Committee on Educational Policies		Committee on Aerial Delivery, <i>Natick, Mass.</i>
	Division of Engineering and Industrial Research, Annual Meeting		Committee on Hearing and Bio-Acoustics, <i>Boston</i>
	International Conference on Scientific Information, Planning Committee		Subcommittee on Fruit and Vegetable Products, <i>St. Louis</i>
29	Highway Research Board, Department Chairmen Staff Committee on the Library Federal Construction Council, Task Group on Waterproofing Masonry Walls	12	Subcommittee on Experimental Cookery, <i>St. Louis</i>
			Committee on Preclinical Screening of the Conference on the Evaluation of Pharmacotherapy in Mental Illness
			Highway Research Board, Department of Traffic and Operations, <i>Chicago</i>
			USA National Committee, International Geophysical Year, Executive Committee
			Food and Nutrition Board, Industry Committee, <i>St. Louis</i>
			Panel on Ferrous Metals
			Subcommittee on Neutron Measurements and Standards, <i>Los Alamos, N. Mex.</i>

June		June	
13	Committee on Rigid Pavement Design	19	International Conference on Scientific Information, Planning Committee
14	Advisory Board on Education Subcommittee on Food Technology with ad hoc Industry Advisory Committee on Packaging Material, <i>St. Louis</i>	20	Committee on Toxicology
	Committee on Foods and Committee on Containers, Joint Meeting, <i>St. Louis</i>	25	Bureau of Public Roads Physical Research Laboratory and Highway Research Board Technical Staff, Joint Meeting
	Subcommittee on Radiation Sterilization, <i>St. Louis</i>	26	Agricultural Board, Executive Committee, <i>Chicago</i>
14-15	Committee on Climatology Advisory to the U. S. Weather Bureau, <i>Columbus, Ohio</i>	26-27	Committee on Fats, <i>Chicago</i>
15	Committee on Veterans Medical Problems	27-28	Food Protection Committee
16	Committee on Prosthetics Research and Development, <i>Berkeley, Calif.</i>	28	Panel on Selenium and Substitutes
17	National Academy of Sciences-National Research Council, Governing Board	28-29	Sponsors for Toxicological Information Center
18-28	Workshop in Developmental Biology, Developmental Biology Conference Series, <i>Bar Harbor, Me.</i>	28-30	Biology Council, Committee on Educational Policies, Subcommittee on Applied Biology and Technical Specialists, <i>Chicago</i>
			Committee on Highway Laws
			Panel on Deterioration Prevention
			Highway Research Board, Executive Committee, <i>Kansas City</i>
			Ad hoc Committee on High Level Dosimetry, <i>Chicago</i>
			Biology Council, Bio-Medical Instrumentation Survey, <i>Dedham, Mass.</i>

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Notice of Academy Meetings

NATIONAL ACADEMY OF SCIENCES

Autumn Meeting, Washington, D. C., November 8-10, 1956

Annual Meeting, Washington, D. C., April 22-24, 1957

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., October 14, 1956

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